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Dated 28 October 2003

Patents Form 1/77

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0225619.6

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The Patent Office
Cardiff Road
Newport
South Wales
NP10 8QQ

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference C577/U

2. Patent application number *(The Patent Office will fill in this part)* 0225619.6

- 2 NOV 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

United Wire Ltd
Granton Park Avenue
Edinburgh
EH5 1HT

5146931002

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation Scotland

4. Title of the invention Improved screen

5. Name of your agent *(if you have one)* Keith W Nash & Co

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

90-92 Regent Street
Cambridge
CB2 1DP

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / yea*
Patents ADP number *(if you know it)* 1206001 ✓		

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / y*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or

b) there is an inventor who is not named as an applicant, or

c) any named applicant is a corporate body.

Yes

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	5
Claim(s)	
Abstract	
Drawing(s)	

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature Date 01/11/2002

Keith W Nash & Co., Agent

12. Name and daytime telephone number of person to contact in the United Kingdom

Keith Nash 01223 355477

Warning

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Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.

b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.

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C577/U

Title: Improved screen

Field of the invention

This invention concerns woven wire cloth screens for filtering liquids from a mixture of solids and liquids, particularly but not exclusively drilling muds. Typically such screens are located in a vibratory shaker to assist in separating the constituents of the mud and to cause the solids left on the wire cloth of the screen to migrate to one end thereof for discharge and collection.

Background

Certain strata produce relatively large highly abrasive particles when drilled, and screens have been found to fail prematurely in use, when drilling through such material. Thus instead of a screen lasting for up to several days before abrasion ruptures the wire cloth, failure has occurred within a few hours.

It is an object of the present invention to provide an improved design of woven wire cloth screen, which overcomes this problem.

Summary of the invention

According to the present invention, in a woven wire cloth screen in which at least one fine mesh cloth overlies a coarser mesh backing cloth, an additional coarser mesh cloth is secured over the fine mesh cloth, whose mesh and wire size at least are selected so as in general to prevent relatively large abrasive particles from making contact with the fine mesh cloth.

In general the tension in wires making up one cloth is arranged to be different from the tension in the wires making up the other cloth and where there are three or more cloths, different tensions may exist in each of the cloths. However it is to be understood that the invention is not limited to arrangements in which each cloth has a different tension from the other(s) and the cloths (or some of them) may have the same tension if appropriate.

The tension of the said additional cloth can affect its performance, and the tension in the mesh of this additional cloth is selected so that it will perform its protective function and not adversely affect the vibration of the fine mesh cloth (or cloths) therebelow.

In general the tension in the additional coarse mesh cloth is greater than that in the fine mesh cloth(s), typically approximately twice the tension in the latter.

Preferably two fine mesh cloths overlie the backing cloth so that one fine mesh cloth is sandwiched between the upper fine mesh cloth and the backing cloth, and the mesh size of the cloth which is so sandwiched is very close to the mesh size of the said upper cloth, and in use assists in de-blinding the upper cloth due to relative vibrational movement between it and the lower fine mesh cloth, and the additional coarser mesh cloth overlies the upper fine mesh cloth.

The mesh size of the additional cloth must be selected with care since if the mesh openings are too large, correspondingly large sharp particles can reach and damage the upper cloth therebelow. Likewise if the openings in the additional cloth are too large the additional cloth may not allow steady migration of separated solids over the screen in use, resulting inter alia in local overloading and failure.

The additional cloth may to advantage have rectangular mesh openings such that for example the openings in the weave are twice as long in one direction as in the other. In general the larger dimensions of the openings in the weave should run parallel to the direction in which separated solids migrate over the surface of the screen in use.

Typically the cloths are stretched over and bonded to a rigid frame and in general such frames are rectangular (although other shaped frames can be used). A screen having a rectangular frame will be referred to as a rectangular screen and in general rectangular screens are normally operated so that the longer dimension of the screen is parallel to the direction in which separated solids migrate over the screen. Therefore as a general rule, where the screen includes a generally rectangular frame to which the cloths are secured, the said additional cloth is fitted to the screen frame so that the larger dimensions of the openings in the weave are parallel to the longer edges of the frame.

Where a screen frame is for example square, and the cloths have rectangular openings, the cloths are preferably fitted to the frame so that the larger dimensions of the mesh openings are parallel to one edge of the frame and the latter is mounted in a shaker so that the direction of solids migration over the screen in use is parallel to the said one edge of the frame.

Examples of improved screens

In a preferred screen having a single fine mesh cloth the three cloths may be as follows:-

Backing cloth:	30# x 0.280mm diameter S/S wire
Fine mesh cloth:	180# x 0.030mm diameter S/S wire
Additional top cloth:	30# x 60# x 0.160mm diameter S/S wire.

In another preferred screen having two fine mesh cloths, the four cloths may be as follows:-

Backing cloth:	30# x 01.280mm diameter S/S wire
Upper fine mesh:	180# x 0.030mm diameter S/S wire
Lower fine mesh:	160# x 0.036mm diameter S/S wire
Additional top cloth:	30# x 60# x 0.160mm diameter S/S wire

Tensions in the wire mesh cloths is normally achieved using pneumatically powered rams acting on clamps which grip the edges of the cloths. If (as is usual) all the rams are of the same size, the tensions imparted to the cloths will be proportional to the air pressure applied to the rams acting on the different cloths.

In the case of a three-cloth screen the pressures applied to the three sets of rams may be in the following ratios:-

Backing mesh	Fine mesh	Additional top mesh
2.0	1.0	1,9

In the case of a four cloth screen the pressures applied to the different sets of rams may be in the following ratios:

Backing mesh	Lower fine mesh	Upper fine mesh	Additional top mesh
2.0	1.0	1.0	1.9

Where the two fine mesh cloths are to have the same tension (as in this last example) they can be tensioned together using the same set of clamps and rams.

If however the tension in one fine mesh cloth is to be different from that in the other fine mesh cloth, then a further set of rams and clamps will be needed to allow each cloth to be tensioned independently of the other.

A screen constructed in accordance with the invention has proved more durable than screens not having the additional cloth when sifting drilling mud recovered from a sea-bed drilling operation as the drill is progressing through sub-sea strata composed of Utsira sand.

The invention also lies in a method of making a woven wire cloth screen which will withstand highly abrasive large particles such as obtained when drilling through Utsira sand, in which a support frame is located in a jig, a coarse backing cloth is stretched over the frame and secured between clamping jaws along all four edges and then tensioned by moving all the clamps relatively outwardly by pneumatic rams, similarly stretching a fine mesh wirecloth over the first cloth and similarly tensioning it by means of a second set of clamps and rams, similarly stretching an additional coarse mesh cloth over the fine mesh cloth and tensioning it by means of a third set of clamps and rams, thereafter securing the cloths to the support frame under pressure, releasing the pressure, opening the clamping jaws, trimming surplus wirecloth back to the frame and removing the finished screen from the jig.

If two fine mesh cloths are required the second fine mesh cloth may be laid over the first fine mesh cloth before the top coarse cloth is applied. Both fine mesh cloths can be clamped with the same set of jaws and rams, or a further set of jaws and rams may be provided for tensioning the second fine mesh cloth. Where only one set of jaws is provided for the two fine mesh cloths the two cloths will have the same tension, but where a separate set of jaws and rams are provided the tension in the second fine mesh cloth may be different from that in the first fine mesh cloth.